

WASHINGTON DEPARTMENT OF ECOLOGY
ENVIRONMENTAL ASSESSMENT PROGRAM
FRESHWATER MONITORING UNIT
STREAM DISCHARGE TECHNICAL NOTES

STATION ID: 25E060
STATION NAME: Abernathy Creek
WATER YEAR: 2014
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Introduction

Watershed Description

Abernathy Creek is a right bank tributary to the Columbia River located approximately 9 miles west of Longview, Washington. Historically the stream supported runs of coho and chinook salmon and steelhead and cutthroat trout. Land use is primarily commercial forestry with state and private holdings. Flow basalt with interbedded sandstone defines the underlying geology. Precipitation varies with elevation but typically ranges between 60 and 70 inches annually. Hydrology is almost entirely rainfall driven.

Gage Location

The gage is on the right bank near the downstream side of the Slide Creek road bridge.

Table 1. Basin Area and Legal Description

Drainage Area (square miles)	20.3
Latitude (degrees, minutes, seconds)	46 12 20.7 north
Longitude (degrees, minutes, seconds)	123 09 14.0 west

Table 2. Discharge Statistics.

Mean Annual Discharge (cfs)	106
Median Annual Discharge (cfs)	76
Maximum Daily Mean Discharge (cfs)	594
Minimum Daily Mean Discharge (cfs)	6.3
Maximum Instantaneous Discharge (cfs)	738
Minimum Instantaneous Discharge (cfs)	5.8
Discharge Equaled or Exceeded 10 % of Recorded Time (cfs)	258
Discharge Equaled or Exceeded 90 % of Recorded Time (cfs)	9.2
Number of Days Discharge is Greater Than Range of Ratings	1
Number of Days Discharge is Less Than Range of Ratings	0
Number of Un-Reported Days	1
Number of Days Qualified as Estimates	0
Number of Modeled Days	0

Note: Statistics displayed in Table 2 may not include values in which the predicted discharge exceeds the range of ratings.

Table 2 Discussion (Discharge Statistics)

A moderately large event at the end of September 2013 elevated discharge values well above baseflow at the beginning of WY2014. Similar, relatively small events continued through the winter and spring. No large events occurred during WY2014. The decline to baseflow conditions began in mid-May for WY2014 which is comparatively early in the water year. The baseflow decline was punctuated throughout July, August, and September by small rain events. The discharge record during baseflow conditions, primarily late July and August were affected by a distinct diurnal oscillation. The diel fluctuation may be due to evapotranspiration within the forested basin. One day was not included in the Table 2 statistics because some of the scans recorded on that day exceeded the stage value associated with twice the highest measured discharge for the effective Rating Table. The absence of this day lowered some of the values in Table 2.

Table 3. Error Analysis Summary.

Potential Logger Drift Error (% of discharge)	1.7
Potential Weighted Rating Error (% of discharge)	11.4
Total Potential Error (% of discharge)	13.1

Table 3 Discussion (Error Analysis)

Total Potential Error (TPO) is the sum of the logger drift error and the weighted rating error. The logger drift error is associated with the difference between the observed value of the primary gage index and the paired stage value logged within the continuous record. The weighted rating error is associated with the quality of discrete discharge measurements used to develop rating curves. The TPO is consistently applied as a range of predicted discharge throughout the hydrograph for the entire water year. For example, if the predicted discharge for WY2014 at Abernathy creek is 100 cfs, the range of predicted flows incorporating the TPO is 113.1 to 86.9 cfs. If the predicted flow is 10 cfs, the range of predicted flows incorporating the TPO is 11.3 to 8.7 cfs.

Table 4. Stage Record Summary

Minimum Recorded Stage (feet)	4.35
Maximum Recorded Stage (feet)	7.72
Range of Recorded Stage (feet)	3.37

Table 4 Discussion (Stage Record)

The Abernathy creek stage record for WY2013 is continuous and complete. Any discrepancies between the primary gage index observations and the stage values recorded on the datalogger were resolved using the data shift function. Small gaps in the data record were accurately filled using linear interpolation.

Table 5. Rating Table Summary

Rating Table No.	8	9	
Period of Ratings	10/01-12/01	11/30-09/30	
Range of Ratings (cfs)	4.2-848	0.001-847	
No. of Defining Measurements	23	18	
Rating Error (%)	10.8	11.5	

Rating Table No.			
Period of Ratings			
Range of Ratings (cfs)			
No. of Defining Measurements			
Rating Error (%)			

Rating Table No.			
Period of Ratings			
Range of Ratings (cfs)			
No. of Defining Measurements			
Rating Error (%)			

Table 5 Discussion (Rating Tables)

Rating Table 8, a very robust rating when coupled to the stage record, predicted discharge for the first two months of WY2014. An event in early December 2013 scoured the control slightly, resulting in a shift to Rating Table 9. Rating Table 9 predicted discharge for the remainder of WY2014.

Table 6. Model Summary

Model Type (Slope conveyance, other, none)	
Range of Modeled Stage (feet)	
Range of Modeled Discharge (cfs)	
Valid Period for Model	
Model Confidence	

Table 6 Discussion (Modeled Data)

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Table 7. Survey Type and Date (station, cross section, longitudinal)

Type	Date

Table 7 Discussion (Surveys)

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Activities Completed

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Appendix